EXHIBIT G

California State Lands Commission Presurvey Notice Requirements for Permittees to Conduct Geophysical Survey Activities

All parts of the Presurvey Notice must be adequately filled out and submitted to the CSLC staff a minimum of twenty-one (21) calendar days prior to the proposed survey date to ensure adequate review and approval time for CSLC staff. Note that one or more of the items may require the Permittee to plan well in advance in order to obtain the necessary documentation prior to the Notice due date (e.g., permits from other State or Federal entities).Please use the boxes below to verify that all the required documents are included in the Presurvey Notice. If "No" is checked for any item, please provide an explanation in the space provided. If additional space is needed, please attach separate pages.

Please use the boxes below to verify that all the required documents are included in the Presurvey Notice. If "No" is checked for any item, please provide an explanation in the space provided. If additional space is needed, please attach separate pages.

Yes	No	
X	☐	Geophysical Survey Permit Exhibit F
X	☐	Survey Location (including a full-sized navigation chart and GPS coordinates for each proposed track line and turning point) Explanation: _____
X	☐	Permit(s) or Authorization from other Federal or State agencies (if applicable) Explanation: *Golden Gate National Recreation Area Permit GOGA-2012-SCI-0006*
X	☐	21-Day Written Notice of Survey Operations to Statewide Geophysical Coordinator/
X	☐	U.S. Coast Guard Local Notice to Mariners
X	☐	Harbormaster and Dive Shop Notifications Explanation: _____
X	☐	Marine Wildlife Contingency Plan Explanation: _____
X	☐	Oil Spill Contingency Plan Explanation: _____
☐	X	Verification of California Air Resources Board's Tier 2-Certified Engine Requirement Explanation: *Vehicle engines are gasoline fueled and exempt from Tier 2 Certification*
X	☐	Verification of Equipment Service and/or Maintenance (must verify sound output) Explanation: _____
☐	X	Permit(s) or Authorization from California Department of Fish and Wildlife for surveys in or affecting Marine Protected Area(s) (if applicable). Explanation: *Survey area is not within MPAs*

._____

NOTE: CSLC staff will also require verification that current biological information was obtained and transmitted as outlined in Section 5 of this permit

EXHIBIT F

PRESURVEY NOTIFICATION FORM

Applicant/Permittee's Mailing Address:
George Tate
USGS Pacific Coastal and Marine Geology
400 Natural Bridges Drive
Santa Cruz, CA 95060

Date: 4/7/16
Jurisdiction: Federal ____State __X_Both ____
If State: Permit #PRC 8394
Region: III
Area: Ocean Beach, San Francisco

GEOPHYSICAL SURVEY PERMIT

Check one: __X__ New survey ____Time extension of a previous notice

U.S.G.S. Pacific Coastal and Marine Geology (Applicant/Permittee) will conduct a geophysical survey offshore California in the survey area outlined on the accompanying navigation chart segment. If you foresee potential interference with commercial fishing or other activities, please contact the person(s) listed below:

FEDERAL WATERS (outside 3 nautical miles)

1) Applicant's representative:
2) Federal representative: (e.g., Bureau of Ocean Energy Management [BOEM] or National Science Foundation [NSF])

NOTE: Any comments regarding potential conflicts in Federal waters must be received by the Applicant's Representative and lead Federal agency within ten (10) days of the receipt of this notice.

STATE WATERS (Inside 3 nautical miles)

1) Permittee's representative: Jenny White
2) CSLC representative: Richard Greenwood

NOTE: Any comments regarding potential conflicts in State waters should be received as soon as possible by the Permittee's representative, no more than fifteen (15) days after the receipt of this notice.

This notice is for six successive monthly surveys of the same area to assess changes in seafloor morphology related to seasonal storms and El Nino Seasonal Oscillations (ENSO), and future anthropogenic influences.

1. Expected Dates of Operation: May 2 – Aug 9, 2016. Up to three 1-day surveys will be conducted approximately at monthly intervals, as weather and project schedules permit. At a minimum, one survey will be conducted near the beginning of the time interval, with up to two additional surveys to document the effects of large wave events on seafloor morphology. The following are expected windows of operation:

May 2-10
May 16-26
May 31-June 9
June 13-24
June 29-July 8
July 13-August 9

2. Hours of Operation: 7AM to 6PM
3. Vessel Names: CPS Duke, CPS Eddie (Personal Watercraft - Jet Skis)
4. Vessel Official Number: USGS-9004807, USGS- 9004808
5. Vessel Radio Call Sign: None Assigned
6. Vessel Captain's Name: Timothy Elfers, Daniel Hoover
7. Vessel will monitor Radio Channel(s): 82a,16
8. Vessel Navigation System: Differential GPS
9. Equipment to be used:

1. Odom Echotrac Bathymetric Echo Sounder
   a. Frequency (Hz, kHz): 200 kHz
   b. Source level: (dB re 1 µPa at 1 meter (m) (rms): 93 dB RMS
   c. Number of beams, across track beam width, and along track beam width:
      1 beam, 9° conical beam. 1.6m along track, 1.6m across track in 10 m water depth.
   d. Pulse rate and length: 4.5-13.5 pps at 34-500 µ seconds depending on water depth.
   e. Rise time: 7 µ seconds
   f. Estimated distances to the 190 dB, 180 dB, and 160 dB re 1 uPa (rms) isopleths,
      190 dB: <1M ; 180 dB: <1M ; 160 dB: <1M

      These estimates are based on the underwater sound propagation equation:

      RSPL= SL-20log (R/Ro)-AR, where

      RSPL=recieved sound potential level

      SL= RMS source level re. 1 uPa (rms) based on manufacturer's specifications

      R= Distance

      Ro= Reference Distance (1 m)

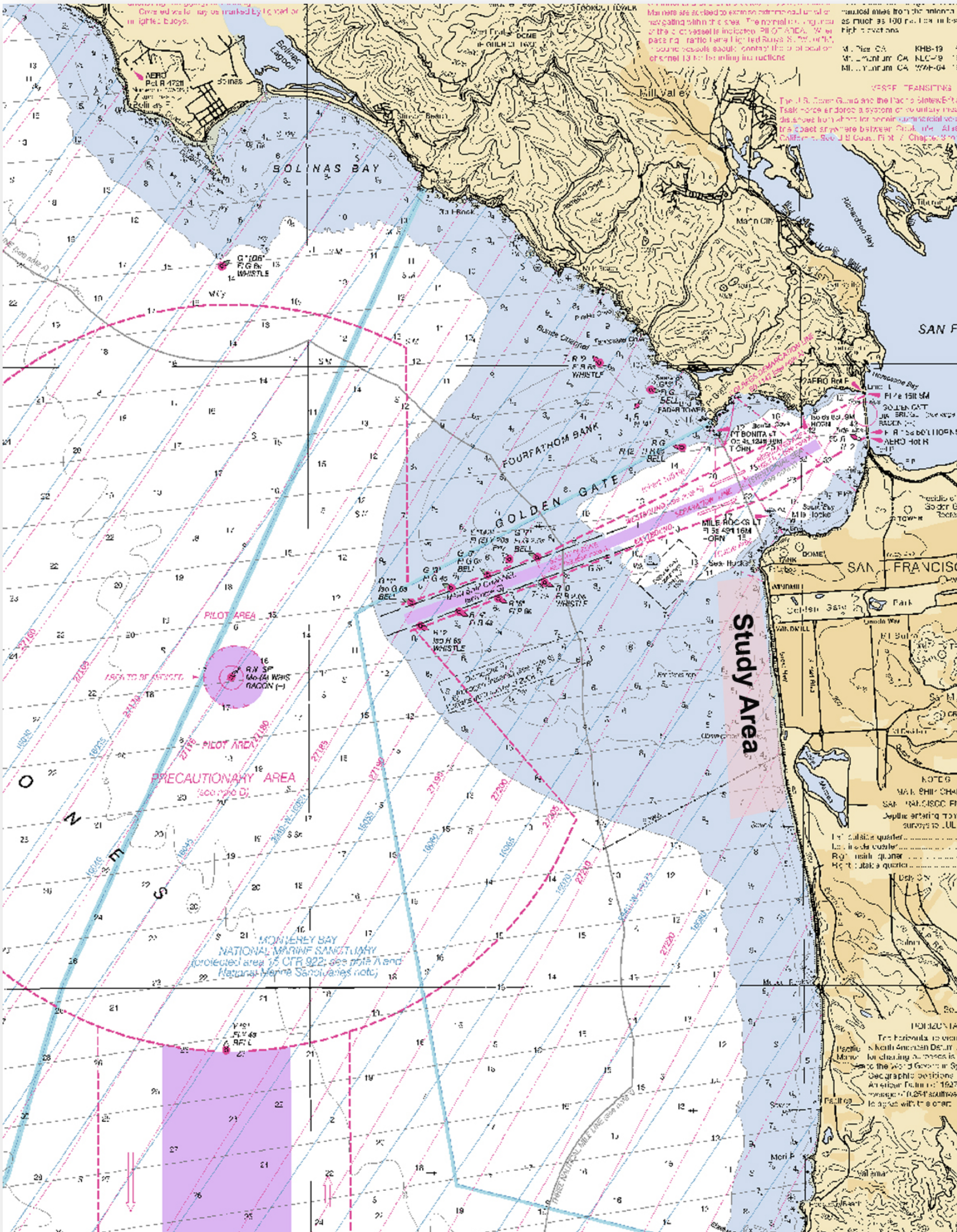
      A= sound absorption coefficient

   g. Deployment depth: 0.25 m
   h. Tow speed: 4 knots
   i. Approximate length of cable tow: 0 m.

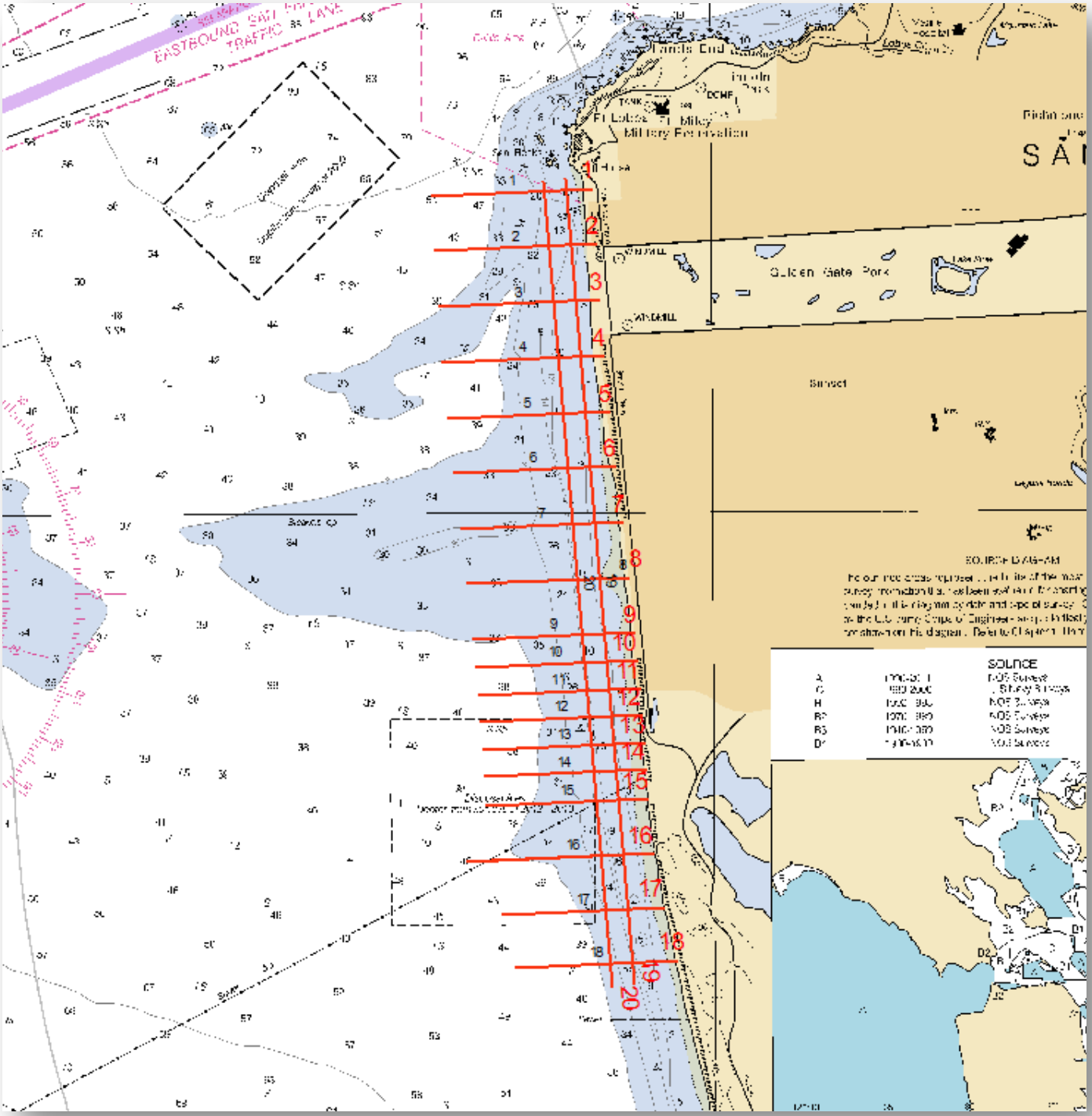
Applicant's Representative:
Jenny White
US Geological Survey
400 Natural Bridges Drive
Santa Cruz, CA 95060
831-460-7544

BOEM Representative:
Joan Barminski
Chief, Office of Reservoir & Production
770 Paseo Camarillo
Camarillo, CA 9301
(805) 389-7707

California State Lands Representative:
Richard B. Greenwood
Statewide Geophysical Coordinator
200 Oceangate, 12th Floor
Long Beach, CA 90802-4331
(562) 590-5201


Study Area
BOLINAS BAY
Mill Valley
Marin City
FOURFATHOM BANK
GOLDEN GATE
MILE ROCKS LT
SAN FRANCISCO
PILOT AREA
PRECAUTIONARY AREA
MONTEREY BAY
NATIONAL MARINE SANCTUARY
VESSEL TRANSITING

Regional Map of Study Area



Detail Map of Study Area

The survey area is bounded by the coordinates:

37° 46.609 -122° 31.798
37° 42.595 -122° 31.798
37° 46.609 - 122° 30.187
37° 42.595 -122° 30.187

The track line coordinates are:

	Start Line		End Line	
Line No.	LAT	LON	Lat	Lon
1	37.77630	-122.51200	37.77578	-122.52854
2	37.77180	-122.51164	37.77127	-122.52830
3	37.76728	-122.51130	37.76676	-122.52797
4	37.76276	-122.51091	37.76223	-122.52758
5	37.75827	-122.51040	37.75774	-122.52707
6	37.75381	-122.50983	37.75329	-122.52650
7	37.74932	-122.50906	37.74880	-122.52572
8	37.74483	-122.50847	37.74431	-122.52513
9	37.74039	-122.50791	37.73986	-122.52457
10	37.73814	-122.50767	37.73761	-122.52433
11	37.73587	-122.50740	37.73535	-122.52406
12	37.73368	-122.50720	37.73315	-122.52386
13	37.73144	-122.50693	37.73091	-122.52359
14	37.72923	-122.50682	37.72870	-122.52348
15	37.72689	-122.50663	37.72636	-122.52329
16	37.72244	-122.50606	37.72192	-122.52272
17	37.71811	-122.50503	37.71758	-122.52169
18	37.71380	-122.50374	37.71327	-122.52040
19	37.71180	-122.50825	37.77713	-122.51496
20	37.71157	-122.51049	37.77690	-122.51720

SCIENTIFIC RESEARCH AND COLLECTING PERMIT

Grants permission in accordance with the attached general and special conditions

United States Department of the Interior
National Park Service

Golden Gate NRA

Study#: GOGA-00060
Permit#: GOGA-2012-SCI-0006
Start Date: Mar 15, 2012
Expiration Date: Dec 31, 2017
Coop Agreement#: n/a
Optional Park Code: n/a

Name of principal investigator:

Name: Patrick Barnard **Phone:** 831-427-4756 **Email:** pbarnard@usgs.gov

Name of institution represented:

United States Geological Survey

Co-Investigators:

Name: Daniel Hoover **Phone:** 650-329-5204 **Email:** dhoover@usgs.gov

Project title:

EPISODIC, SEASONAL, AND LONG-TERM VARIATIONS IN BEACH MORPHOLOGY AND SEDIMENT TRANSPORT ADJACENT TO A MAJOR TIDAL INLET ON A HIGH-ENERGY COAST, OCEAN BEACH, SAN FRANCISCO, CALIFORNIA

Purpose of study:

The vast majority of the California coastline is actively eroding. Major storms in 1982-83, 1995, 1997-98 and 2009-10 caused significant shoreline retreat and major property damage statewide. Erosion has been accelerated by human alterations to the environment (RAC, 1995), and rising sea level during the past century combined with rapid coastal development has put enormous stresses on the coastal zone. During the next 100 years, sea level rates are projected to rise up to 3 times faster than at present (Leatherman et al., 2003), making it increasingly important to understand the complex sediment transport and sedimentation patterns that control beach morphodynamics. A greater understanding of beach processes will enable us to make better informed coastal management decisions to mitigate erosion and storm damage, and to better preserve sensitive coastal environments.

The West Coast of the United States is among the least understood of the coastal environments, because high wave energy has limited the use of traditional monitoring methods used to study processes controlling sediment transport. Recently, the evolution of remote sensing techniques such as airborne scanning laser (LIDAR) surveys and Video Beach Monitoring Stations, has allowed for unprecedented precision in monitoring large stretches of coast. Furthermore, advances in the strength and durability of instrumentation (e.g. current meters) now make their deployment possible in high-energy settings.

The shoreline of Ocean Beach, located in San Francisco, California, has been slowly retreating since the mid-1990â s, with accelerated rates in certain areas (Wiegel, 2001). The U.S. Army Corps of Engineers, San Francisco City Department of Public Works and Department of the Environment, National Park Service, members of the USGS, and a citizens group have joined to form the Ocean Beach Task Force in an effort to address this problem. In 2004, we began conducting research and monitoring in Ocean Beach and other areas around the mouth of San Francisco Bay to obtain quantitative data on beach behavior and on processes affecting sediment transport.

The proposed study will build on our earlier research by extending our beach and subtidal monitoring program to near-decadal and hopefully longer timescales, and by continuing targeted research on sediment transport at Ocean Beach and other suitable sites in the GGNRA. The ultimate goal of this project is to identify and quantify the physical processes that control nearshore and beach morphology, enabling the various government agencies involved to make the most informed management decisions possible.

Subject/Discipline:

Geomorphology / Surface Processes

Locations authorized:

Regular ATV beach topographic mapping surveys will take place on the active portion of Ocean Beach (i.e. excluding vegetated dunes) from the most northerly accessible portion (typically below the Cliff House), to a southerly limit roughly adjacent to Fort Funston. Similarly, PWC surveys will be performed inside and outside the surf zone from just south of Seal Rock below the Cliff House, to a southerly limit roughly adjacent to Fort Funston. Additional bathymetric and

topographic surveys, including limited sediment sampling, may be conducted at other areas in the GGNRA, such as Crissy Field and Baker and China Beach near the Golden Gate, and Muir and Stinson Beaches north of the Golden Gate.

Transportation method to research site(s):

Access for regular ATV topographic surveys of Ocean Beach would be via ATV from the parking lot at the north end of Ocean Beach. Access for bathymetric surveys would be via PWCs transiting from the small boat launch at Fort Baker, or via beach launch and retrieval at Ocean Beach. Access to other sites would be coordinated with NPS as needed.

Collection of the following specimens or materials, quantities, and any limitations on collecting:

n/a

Name of repository for specimens or sample materials if applicable:

Repository type: Will be destroyed through analysis or discarded after analysis
Objects collected:
Small-volume (~200 ml) sand samples for mineralogical analysis. No sampling currently is planned, but if sampling is warranted we would expect to collect on the order of 50 - 100 samples from representative locations throughout beach settings in the GGNRA.

Specific conditions or restrictions (also see attached conditions):

1. Notify NPS Dispatch (415-561-5505) prior to conducting any surveys on the beach or offshore. Provide dates and times of anticipated surveys.

2. Researcher should be available to brief Ocean Beach Task Force on the project at one of their meetings if requested.

3. ATV's and PWC's should be driven at as slow a speed as possible, with as few passes as necessary to complete the survey. Consider scheduling surveys for calmer days and/or re-scheduling if high waves are present.

4. Researchers should wear clothing that identifies their affiliation with the USGS. Likewise, ATV's and PWC's should have placards identifying them as USGS vehicles.

5. For any new or unique sampling that has not previously been conducted or is not part of routine surveys done to date, coordinate with Kristen Ward, NPS Natural Resources, in advance of sampling Tel No. (415) 289-1846, or email; kristen_ward@nps.gov

GENERAL CONDITIONS
For
SCIENTIFIC RESEARCH AND COLLECTING PERMIT

United States Department of the Interior
National Park Service

1. **Authority** - The permittee is granted privileges covered under this permit subject to the supervision of the superintendent or a designee, and shall comply with all applicable laws and regulations of the National Park System area and other federal and state laws. A National Park Service (NPS) representative may accompany the permittee in the field to ensure compliance with regulations.

2. **Responsibility** - The permittee is responsible for ensuring that all persons working on the project adhere to permit conditions and applicable NPS regulations.

3. **False information** - The permittee is prohibited from giving false information that is used to issue this permit. To do so will be considered a breach of conditions and be grounds for revocation of this permit and other applicable penalties.

4. **Assignment** - This permit may not be transferred or assigned. Additional investigators and field assistants are to be coordinated by the person(s) named in the permit and should carry a copy of the permit while they are working in the park. The principal investigator shall notify the park's Research and Collecting Permit Office when there are desired changes in the approved study protocols or methods, changes in the affiliation or status of the principal investigator, or modification of the name of any project member.

5. **Revocation** - This permit may be terminated for breach of any condition. The permittee may consult with the appropriate NPS Regional Science Advisor to clarify issues resulting in a revoked permit and the potential for reinstatement by the park superintendent or a designee.

6. **Collection of specimens (including materials)** - No specimens (including materials) may be collected unless authorized on the Scientific Research and Collecting permit.

The general conditions for specimen collections are:

- Collection of archeological materials without a valid Federal Archeology Permit is prohibited.
- Collection of federally listed threatened or endangered species without a valid U.S. Fish and Wildlife Service endangered species permit is prohibited.
- Collection methods shall not attract undue attention or cause unapproved damage, depletion, or disturbance to the environment and other park resources, such as historic sites.
- New specimens must be reported to the NPS annually or more frequently if required by the park issuing the permit. Minimum information for annual reporting includes specimen classification, number of specimens collected, location collected, specimen status (e.g., herbarium sheet, preserved in alcohol/formalin, tanned and mounted, dried and boxed, etc.), and current location.

- Collected specimens that are not consumed in analysis or discarded after scientific analysis remain federal property. The NPS reserves the right to designate the repositories of all specimens removed from the park and to approve or restrict reassignment of specimens from one repository to another. Because specimens are Federal property, they shall not be destroyed or discarded without prior NPS authorization.
- Each specimen (or groups of specimens labeled as a group) that is retained permanently must bear NPS labels and must be accessioned and cataloged in the NPS National Catalog. Unless exempted by additional park-specific stipulations, the permittee will complete the labels and catalog records and will provide accession information. It is the permittee's responsibility to contact the park for cataloging instructions and specimen labels as well as instructions on repository designation for the specimens.
- Collected specimens may be used for scientific or educational purposes only, and shall be dedicated to public benefit and be accessible to the public in accordance with NPS policies and procedures.
- Any specimens collected under this permit, any components of any specimens (including but not limited to natural organisms, enzymes or other bioactive molecules, genetic materials, or seeds), and research results derived from collected specimens are to be used for scientific or educational purposes only, and may not be used for commercial or other revenue-generating purposes unless the permittee has entered into a Cooperative Research And Development Agreement (CRADA) or other approved benefit-sharing agreement with the NPS. The sale of collected research specimens or other unauthorized transfers to third parties is prohibited. Furthermore, if the permittee sells or otherwise transfers collected specimens, any components thereof, or any products or research results developed from such specimens or their components without a CRADA or other approved benefit-sharing agreement with NPS, permittee will pay the NPS a royalty rate of twenty percent (20%) of gross revenue from such sales or other revenues. In addition to such royalty, the NPS may seek other damages to which the NPS may be entitled including but not limited to injunctive relief against the permittee.

7. **Reports** - The permittee is required to submit an Investigator's Annual Report and copies of final reports, publications, and other materials resulting from the study. Instructions for how and when to submit an annual report will be provided by NPS staff. Park research coordinators will analyze study proposals to determine whether copies of field notes, databases, maps, photos, and/or other materials may also be requested. The permittee is responsible for the content of reports and data provided to the National Park Service.

8. **Confidentiality** - The permittee agrees to keep the specific location of sensitive park resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.

9. **Methods of travel** - Travel within the park is restricted to only those methods that are available to the general public unless otherwise specified in additional stipulations associated with this permit.

10. **Other permits** - The permittee must obtain all other required permit(s) to conduct the specified project.

11. **Insurance** - If liability insurance is required by the NPS for this project, then documentation must be provided that it has been obtained and is current in all respects before this permit is considered valid.

12. **Mechanized equipment** - No use of mechanized equipment in designated, proposed, or potential wilderness areas is allowed unless authorized by the superintendent or a designee in additional specific conditions associated with this permit.

13. **NPS participation** - The permittee should not anticipate assistance from the NPS unless specific arrangements are made and documented in either an additional stipulation attached to this permit or in other separate written agreements.

14. **Permanent markers and field equipment** - The permittee is required to remove all markers or equipment from the field after the completion of the study or prior to the expiration date of this permit. The superintendent or a designee may modify this requirement through additional park specific conditions that may be attached to this permit. Additional conditions regarding the positioning and identification of markers and field equipment may be issued by staff at individual parks.

15. **Access to park and restricted areas** - Approval for any activity is contingent on the park being open and staffed for required operations. No entry into restricted areas is allowed unless authorized in additional park specific stipulations attached to this permit.

16. **Notification** - The permittee is required to contact the park's Research and Collecting Permit Office (or other offices if indicated in the stipulations associated with this permit) prior to initiating any fieldwork authorized by this permit. Ideally this contact should occur at least one week prior to the initial visit to the park.

17. **Expiration date** - Permits expire on the date listed. Nothing in this permit shall be construed as granting any exclusive research privileges or automatic right to continue, extend, or renew this or any other line of research under new permit(s).

18. **Other stipulations** - This permit includes by reference all stipulations listed in the application materials or in additional attachments to this permit provided by the superintendent or a designee. Breach of any of the terms of this permit will be grounds for revocation of this permit and denial of future permits.

White, Jennifer <jennifer_white@usgs.gov>

Pre-survey Notice of Geophysical Survey Operations at San Francisco's Ocean Beach - Geophysical Coordinator

1 message

White, Jennifer <jennifer_white@usgs.gov> Fri, Apr 8, 2016 at 1:11 PM
To: slc.ogpp@slc.ca.gov, D11LNM@uscg.mil
Cc: "richard.greenwood" <Richard.Greenwood@slc.ca.gov>, "Keen, Kelly@SLC" <Kelly.Keen@slc.ca.gov>

PRE SURVEY NOTIFICATION FOR GEOPHYSICAL SURVEY

The USGS Pacific Coastal and Marine Science Center (PCMSC) will be conducting a geophysical survey off of Ocean Beach, San Francisco, CA under California State Lands Permit #8394. The operations to be conducted will be a bathymetric survey using a 200 kHz single beam echo sounder mounted on a personal watercraft (jet ski). The survey operational window will be May 2 - Aug 9, 2016. Two personal watercraft will be used to conduct cross shore transects from within the surf zone out to 1200m from shore to document the effects of large wave events on seafloor morphology.

In keeping with our California State Lands Permit requirements, we are providing you with the attached Geophysical Pre-Survey Notice for your information.

--
Jenny White
Marine Operations Manager
Pacific Coastal and Marine Science Center
U.S. Geological Survey
(831) 818-8915 cell
(831) 460-7485 work

White, Jennifer <jennifer_white@usgs.gov>

Pre-survey Notice of Geophysical Survey Operations at San Francisco's Ocean Beach - Harbor Masters

1 message

White, Jennifer <jennifer_white@usgs.gov> Fri, Apr 8, 2016 at 1:11 PM
To: harbormaster@smharbor.com, jhaynes@santacruzharbor.org
Cc: "Keen, Kelly@SLC" <Kelly.Keen@slc.ca.gov>, "richard.greenwood" <Richard.Greenwood@slc.ca.gov>

PRE SURVEY NOTIFICATION FOR GEOPHYSICAL SURVEY

The USGS Pacific Coastal and Marine Science Center (PCMSC) will be conducting a geophysical survey off of Ocean Beach, San Francisco, CA under California State Lands Permit #8394. The operations to be conducted will be a bathymetric survey using a 200 kHz single beam echo sounder mounted on a personal watercraft (jet ski). The survey operational window will be May 2 - Aug 9, 2016. Two personal watercraft will be used to conduct cross shore transects from within the surf zone out to 1200m from shore to document the effects of large wave events on seafloor morphology.

In keeping with our California State Lands Permit requirements, we are providing you with the attached Geophysical Pre-Survey Notice for your information.

--
Jenny White
Marine Operations Manager
Pacific Coastal and Marine Science Center
U.S. Geological Survey
(831) 818-8915 cell
(831) 460-7485 work

BISON CONNECT

White, Jennifer <jennifer_white@usgs.gov>

Pre-survey Notice of Geophysical Survey Operations at San Francisco's Ocean Beach - Dive Shops

1 message

White, Jennifer <jennifer_white@usgs.gov> Fri, Apr 8, 2016 at 1:11 PM
To: andersonscuba@aol.com, Steven Chung <hdc@harbordive.com>
Cc: "richard.greenwood" <Richard.Greenwood@slc.ca.gov>, "Keen, Kelly@SLC" <Kelly.Keen@slc.ca.gov>

PRE SURVEY NOTIFICATION FOR GEOPHYSICAL SURVEY

The USGS Pacific Coastal and Marine Science Center (PCMSC) will be conducting a geophysical survey off of Ocean Beach, San Francisco, CA under California State Lands Permit #8394. The operations to be conducted will be a bathymetric survey using a 200 kHz single beam echo sounder mounted on a personal watercraft (jet ski). The survey operational window will be May 2 - Aug 9, 2016. Two personal watercraft will be used to conduct cross shore transects from within the surf zone out to 1200m from shore to document the effects of large wave events on seafloor morphology.

In keeping with our California State Lands Permit requirements, we are providing you with the attached Geophysical Pre-Survey Notice for your information.

--
Jenny White
Marine Operations Manager
Pacific Coastal and Marine Science Center
U.S. Geological Survey
(831) 818-8915 cell
(831) 460-7485 work

Marine Wildlife Mitigation Plan
Ocean Beach Bathymetric Surveys

(May 2 – August 9, 2016)

1.0 INTRODUCTION

This marine wildlife mitigation plan is prepared in compliance with the USGS Pacific Coastal and Marine Geology Science Center's existing State Geophysical Permit PRC 8394. This plan is intended to provide guidance to USGS vehicle operators and scientific field personnel collecting geophysical data for the Pacific Coastal and Marine Geology Science Center (PCMSC) in Santa Cruz, CA to avoid significant impacts to marine wildlife that may occur during regular geophysical surveys.

1.1 Regulatory Basis

Species that are either currently in danger or soon likely to be in danger of extinction throughout all or a portion of its range are protected by the Endangered Species Act of 1973. The United States Fish and Wildlife Service (USFWS), and the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) implement the Endangered Species Act. During the consultation with NMFS to issue a permit for the offshore geophysical survey, it was determined no incidental take permits are required to use the equipment identified in this document to conduct scientific data acquisition in federal waters offshore of the California coast.

1.2 Geophysical Survey Purpose and Objectives

The USGS Pacific Coastal and Marine Science Center is studying the effects of waves, currents and human activity on the coastline and adjacent seabed off of Ocean Beach, San Francisco. Ocean Beach is subject to large waves from winter storms and strong currents associated with tidal exchange with nearby San Francisco Bay; as a result the area is extremely dynamic. The shoreline of Ocean Beach has been slowly retreating since the mid-1990's, with accelerated rates in certain areas (Wiegel, 2001). The U.S. Army Corps of Engineers, San Francisco City Department of Public Works and Department of the Environment, National Park Service, members of the USGS, and a citizens group have joined to form the Ocean Beach Task Force in an effort to address this problem. In 2004, we began conducting research and monitoring in Ocean Beach and other areas around the mouth of San Francisco Bay to obtain quantitative data on beach behavior and on processes affecting sediment transport.

Targeted bathymetric surveys will build on our earlier research by extending our beach and subtidal monitoring program to near-decadal and hopefully longer timescales. The ultimate goal of this project is to identify and quantify the physical processes that control nearshore and beach morphology, enabling the various government agencies involved to make the most informed management decisions possible.

PCMG will contact the NOAA Long Beach Office staff and local whale-watching operations to acquire information on the current composition and relative abundance of marine wildlife offshore as well as any pinniped haul out sites. Whale activity is moderate at the moment. The peak whale season is February - May in the San Francisco Bay Region. Additionally, one

day prior to survey activities, the NOAA Long Beach office, local whale watching operations will be contacted to get an update on marine wildlife sightings in the area. This information will be conveyed to the captain and crew prior to the survey.

A review of environmental responsibility of project operations will be conducted by the chief scientist in charge of the survey operations prior to commencing the first day of operations. When new personnel will be in the crew, this training will be repeated at least for those new to the crew. They will be made aware of their individual responsibility and will be shown how to be aware of possible environmental impacts and how to mitigate them during the geophysical survey operations. Information relating to seasonality, as an indication of the types of animals that might be in our survey area, at the time of survey work will also be presented to the crew. A copy of this document will be provided to the crew of our survey vehicles.

All personnel will be expected to be consistently aware that they are to be alert to any presence of marine wildlife while they are performing their duties. There are a number of signs/indications of marine wildlife presence and each crew member will be responsible to maintain vigilance for those signs within the constraints of their project duties. Some of those indications are:

a. Sounds - such as splashing, vocalizations (by animals and birds), and blowing (breathing).

b. Visual indications - birds aggregating, changes in water character such as areas of rippled
water, white water caused by splashing, changes in color or shape of the ocean surface

1.3 Survey Schedule and Layout

The Project window will be from May 2, 2016 through August 9, 2016. At least one survey will be conducted near the beginning of the project period to document the aggregate effect of winter waves on nearshore bathymetry. Up to two additional surveys will be conducted towards the end of the survey window. For safety reasons, the survey vehicles are always used in tandem—two at a time— with personnel support on the adjacent beach. Permits and permissions for beach use have been obtained from the National Park Service (Permit GOGA-2012-SCI-0006). Survey vehicles will be launched from Fort Baker, on the north side of the Golden Gate, and will transit at safe speeds to the survey locations. Surveys normally will be conducted during high tides, and across-shore transects will be surveyed from the surf zone (about 1 m depth) to 1-2 km offshore. Survey vehicle operators will operate on survey lines only when conditions are safe and swimmers, paddlers, and wildlife are not present. Data collected in this region are critical however, as most of the sand movement in nearshore areas occurs at shallow depths (Figure 2). Sediment volume changes will be calculated from profile data to determine the rates of net sediment transport between different reaches of the beach, as well as the rates of net on- or offshore transport. This will aid in determining littoral drift rates and in constructing a sediment budget for the system.

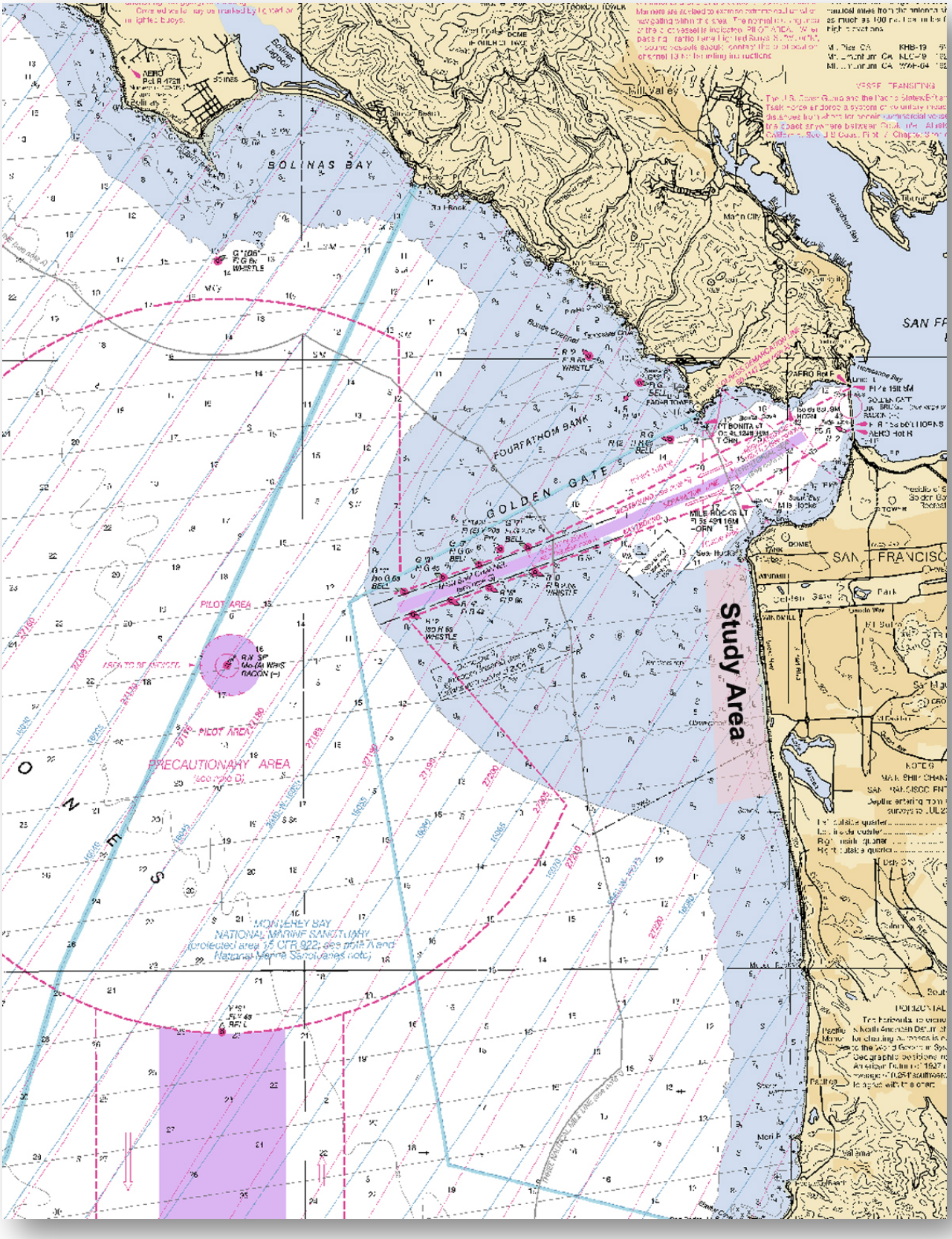


Figure 1. Regional Map of Survey Area

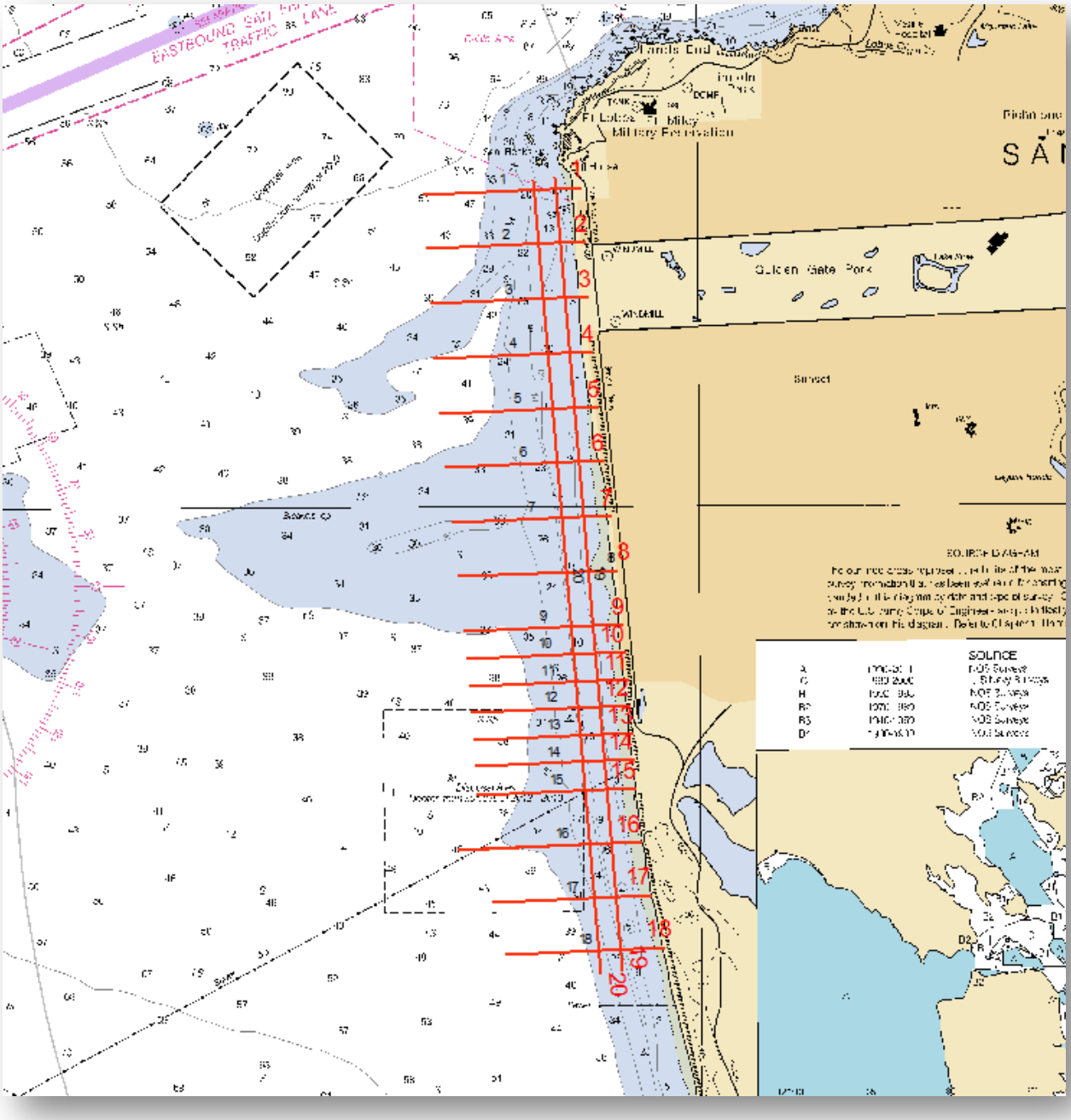


Figure 2. Detail Map of Survey Area

2.0 Survey Equipment and Activities

Nearshore mapping would utilize two USGS Coastal Profiling Systems (CPS), which consist of a personal watercraft instrumented with GPS-based mapping systems and fathometers. CPS are not operated in high surf (generally greater than 5 feet) or in difficult weather conditions such as fog or rain. All CPS operators are USGS employees, insured, and safety-certified by the U.S. Department of Interior.

PCMG proposes to use the following equipment to collect the required data:

- Odom Echotrac CV100 echo sounder using a 200 kHz, 9° downward conical beam transducer

The proposed survey will require the use of a marine vehicle and in-water equipment that generate noise during data acquisition. The results of modeling of the noise generated by the survey equipment is shown in Table 1. Those results indicate that operational source level used for these surveys are less than 160 dB at any range.

Table 1. Distances to Received Pressure Levels from Equipment Sound Source

Sounder System	Frequency (kHz)	Source Level (dB peak)	Source Level (dB rms)	Distance toSL160 dBrms (meters)	Distance to SL 180 dB (rms) (meters)	Distance toSL190 dB (rms) (meters)
Odom Echotrac CV100 Echo Sounder	200 kHz	109	93	<1	<1	<1

These estimates are based on the underwater sound propagation equation:

RSPL= SL-20log (R/Ro)-AR where,
RSPL=Recieved sound potential level
SL= RMS source level re. 1 uPa (rms) based on manufacturer's specifications
R= Distance
Ro= Reference Distance (1 m)
A= sound absorption coefficient

The greatest distance from the sound source to the 160 dB level (<1 m) for the proposed equipment) is considered the "safety zone" for this equipment. However, because the operating frequency of 200 kHz is above the cutoff hearing threshold for marine mammals, CSLC has determined that the observance of the "safety zones" is not a requirement for this survey (personal communication, K. Keen, CSLC).

3.0 Marine Wildlife

3.1 Marine Wildlife

The following discusses the marine wildlife that have been recorded within the project region, those taxa that are most likely to be within the larger project region during survey operations, and methods that will be instituted by the vehicle operator to reduce or eliminate potential impacts to marine wildlife during transit and survey operations.

Table 2 provides information on the seasonal variations in the marine wildlife that are expected to be or have been reported within the Project area.

Table 2: Abundance Estimates for Marine Mammals and Reptiles of California Unless Otherwise Indicated

Common Name *Scientific Name*	**Population Estimate**	**Current Population Trend**
REPTILES		
Cryptodira		
Olive Ridley turtle *Lepidochelys olivacea*	1.39 million (Eastern Tropical Pacific)**	Increasing
Green turtle *Chelonia mydas*	3,319-3,479** (Eastern Pacific Stock)	Increasing
Loggerhead turtle *Caretta caretta*	1,000 (California)**	Decreasing
Leatherback turtle *Dermochelys coriacea*	178 (California)**	Decreasing
MAMMALS		
Mysticeti		
California gray whale *Eschrichtius robustus*	18,017 (Eastern North Pacific Stock)	Fluctuating annually
Fin whale *Balaenoptera physalus*	2,624 (California/Oregon/Washington Stock)	Increasing off California
Humpback whale *Megaptera novaeangliae*	1,878 (California/Oregon/Washington Stock)	Increasing
Blue whale *Balaenoptera musculus*	2,046 (Eastern North Pacific Stock)	Unable to determine
Minke whale *Balaenoptera acutorostrata*	202 (California/Oregon/Washington Stock)	No long-term trends suggested
Northern right whale *Eubalaena japonica*	17 (based on photo-identification) (Eastern North Pacific Stock)	No long-term trends suggested
Sei whale *Balaenoptera borealls*	83 (Eastern North Pacific Stock)	No long-term trends suggested
Odontoceti		
Short-beaked common dolphin *Delphinus delphis*	343,990 (California/Oregon/Washington Stock)	Unable to determine
Long-beaked common dolphin *Delphinus capensls*	17,127 (California Stock)	Unable to determine
Dall's porpoise *Phocoenoides dalli*	32,106 (California/Oregon/Washington Stock)	Unable to determine
Harbor porpoise *Phocoena phocoena*	1,478 (Morro Bay Stock)	Increasing
Pacific white-sided dolphin *Lagenorhynchus obllquldens*	21,406 (California/Oregon/Washington Stock)	No long-term trends suggested
Risso's dolphin *Grampus griseus*	4,913 (California/Oregon/Washington Stock)	No long-term trends suggested
Short-finned pilot whale *Globicephala macrorhynchus*	465 (California/Oregon/Washington Stock)	No long-term trends suggested

Bottlenose dolphin *Turslops truncates*	684 (California/Oregon/Washington Offshore Stock)	No long-term trends suggested
	290 (California Coastal Stock)	No long-term trends suggested
Northern right whale dolphin *LIssopelphis borealis*	6,019 (California/Oregon/Washington Stock)	No long-term trends suggested
Sperm whale *Physeter macrocephalus*	751 (California/Oregon/Washington Stock)	No long-term trends suggested
Killer whale Orcinus orca	85 (Eastern North Pacific Southern Resident Stock)	Decreasing
	162 (Eastern North Pacific Offshore Stock)	No long-term trends suggested
Pinnipedia		
California sea lion *Zalophus californianus*	141,842 (U.S. Stock)	Unable to determine; increasing in most recent three year period
Northern fur seal *Callorhinus ursinus*	5,395 (San Miguel Island Stock)	Increasing
Guadalupe fur seal *Arctocephalus townsendi*	3,028 (Mexico Stock) Undetermined in California	Increasing
Northern (Steller) sea lion *Eumetopias jubatus*	2,479 California Stock	Decreasing
Northern elephant seal *Mirounga angustirostris*	74,913	Increasing
Pacific harbor seal *Phoca vitulina richardsi*	31,600	Stable
Fissipedia		
Southern sea otter *Enhydra lutris nereis*	2,711*	Unable to determine

Estimates provided by National Marine Fisheries Service (NOAA Fisheries 2011) *

Estimate provided by USGS (2010)

** Estimates provided by National Marine Fisheries Service (NMFS) (2004), Marquez, et al. (2002), Eguchi et ai. (2007), Benson et al. (2007), and NMFS (2007). Estimates are based on number of current numbers of nesting females.

During the transit periods, there is a potential for encountering marine wildlife. Table 3 lists those species that are likely to occur in the survey area

Table 3. Marine Wildlife Species and Most Likely Periods of Occurrence within the Survey Area

Family Common Name	Month of Occurrence [1]											
	J	F	M	A	M	J	J	A	S	O	N	D
REPTILES												
Cyptodira												
Olive Ridley turtle *(T)* [2]												
Green turtle (T) [1],[2]												
Loggerhead turtle (T) [2]												
Leatherback turtle (E) [2]												
MAMMALS												
Mysticeti												
California gray whale												
Blue whale (E)												
Fin whale (E)												
Humpback whale (E)												
Minke whale												
Sei whale (E)												
Northern right whale (E)												
Odontoceti												
Short-beaked common dolphin												
Dall's porpoise												
Harbor porpoise												
Long-beaked common dolphin												
Pacific white-sided dolphin												
Risso's dolphin												
Sperm whale												
Short-finned pilot whale												
Bottlenose dolphin												
Northern right whale dolphin												
Killer whale												
Pinnipedia												
Northern fur seal [3]												
California sea lion												
Northern elephant seal [4]												
Pacific harbor seal												
Guadalupe fur seal (T)												
Steller sea lion												
Fissipedia												
Southern sea otter (T) [5]												
Relatively uniform distribution		Not expected to occur					Most likely to occur due to seasonal distribution					

(E) Federally listed endangered species.
(T) Federally listed threatened species.
(1) Not Used
(2) Rarely encountered, but may be present year-round. Greatest abundance during July through September.
(3) Only a small percent occur over continental shelf (except near San Miguel rookery, May-November).
(4) Common near land during winter breeding season and spring molting season.
(5) Only nearshore (diving limit 100 feet).
Sources: Bonnell and Dailey (1993), NOAA Fisheries (2011), NCCOS (2007)

4.0 ONBOARD MITIGATIONS

4.1 Fishing Gear Clearance

In addition to submitting the required Notice to Mariners that will advise commercial fishers of pending on-water activities, prior to the start of each survey day the vehicles will traverse the proposed survey corridor for that day to note and record the presence of deployed fishing gear. No survey lines within 30 m (100 ft) of the observed fishing gear will be completed. The survey crew will not remove or relocate any fishing gear; removal or relocation will only be accomplished by the owner or by an authorized CDFG agent.

4.3 Marine Wildlife Monitoring

NOAA does not require exclusion/safety zones to be monitored for this survey. The operational source level for these survey operations is 93 dB RMS at 200 kHz, well below the maximum 160 dB sound level considered safe for operating in the proximity of marine mammals. Because there is only one CPS operator on board the survey vehicle during survey operation, their primary responsibilities during survey operations is the safe operation of the vehicle and operation of the data acquisition system, it is not possible for them to log wildlife observation data. However, the operator will provide a narrative of any sightings or encounters with marine wildlife during the day's survey operations and these narratives will be provided in the summary report for each survey.

4.3 Mitigations During Transit and Survey

The research vehicles will transit during daylight hours from the USCG Golden Gate Station at Fort Baker. During transits, there is a potential for encountering marine wildlife and the vehicle operators will take every precaution to avoid close proximity to wildlife. During transits, the vehicle will maintain a minimum distance of 100 m (1,640 ft.) from observed animals. If the vehicle operator observes a marine mammal within the path of the transiting vehicle, they will immediately slow the vehicle and/or change course in order to avoid contact.

Cetaceans (whales) vary in their swimming patterns and duration of dives and therefore all shipboard personnel will be watchful as the vehicle crosses the path of a whale or anytime whales are observed in the area.

If whales are observed during transits, the vehicle operator will institute the following measures:

- Maintain a minimum distance of 100 m from sighted whales;
- Do not cross directly in front of or across the path of sighted whales;
- When transit directions is parallel to whale path, maintain constant speed that is not greater than the whales speed, or alter transit direction away from whale path;
- Do not position the vehicle in such a manner to separate female whales from their

calves;

- If a whale engages in evasive or defensive action, slow the vehicle and move away from the animal until the animal calms or moves out of the area.

During survey operations, the vehicle will maintain survey a speed of approximately 4 knots and will maintain a heading that coincides with survey track lines. If marine wildlife is observed within the vicinity of the vehicle, the vehicle operator will take precautions to avoid collision, ending and restarting the track line survey if necessary.

If a collision with marine wildlife occurs, the vehicle operator will document the conditions under which the accident occurred, including the following:

- Location of the vehicle when the collision occurred (latitude and longitude);
- Date and time;
- Speed and heading of the vehicle;
- Observed conditions (e.g., wind speed and direction, swell height, visibility in miles or kilometers, and presence of rain or fog);
- Species of marine wildlife contacted; and
- Organization, vehicle ID and name of master in charge of the vehicle at time of accident.

In accordance with NOAA requirements, after a collision, the vehicle should stop, if safe to do so. The vehicle may proceed after confirming that it will not further damage the animal by doing so. The vehicle will then communicate by radio or telephone all details to the vehicle's base of operations. The PCMG Marine Operations Superintendent will contact the Stranding Coordinator, NMFS, Southwest Region, Long Beach, to obtain instructions. Alternatively, the vehicle captain may contact the NMFS Stranding Coordinator directly using the marine operator to place the call or directly from an onboard telephone, if available to:

NOAA Southwest Regional Stranding Coordinator
National Marine Fisheries Service
501 West Ocean Blvd, Suite 4200
Long Beach, CA 90802-4213
562-980-4017
Contact: Sarah Wilkin
Email: sarah.wilkin@noaa.gov

It is unlikely that the vehicle will be asked to stand by until NOAA or CDFG personnel arrive, however this will be determined by the Stranding Coordinator. According to the MMPA, the vehicle operator is not allowed to aid injured marine wildlife or recover the carcass unless requested to do so by the NOAA Stranding Coordinator.

Although NOAA has primary responsibility for marine mammals in both state and federal waters, the CDFG will also be advised that an incident has occurred in state waters affecting a protected species. Reports should be communicated to the federal and state agencies listed below:

Federal	**State**	**State**
Sarah Wilkin, Stranding Coordinator Southwest Region National Marine Fisheries Service Long Beach, California (562)980-4017	Enforcement Dispatch Desk California Department of Fish and Game Long Beach, California (562)590-5132	California State Lands Commission Mineral Resources Management Division Long Beach, California (562) 590-5201

4.4 Operational Measures

Soft Start

The soft-start technique required for sonar equipment operating above the hearing threshold for marine mammals at 200 kHz is predicated on research investigations of low frequency side lobes for 200 kHz sonar systems (Deng et al., 200 kHz Commercial Sonar Systems Generate Lower Frequency Side Lobes Audible to Some Marine Mammals, PLOS ONE, 2014). This work was based on a measured 90 kHz sub harmonic at 141 dB re. 1µPA @ 1m generated by a 200 kHz sonar signal at 195 dB re. 1µPA @ 1m and a marine mammal hearing threshold of 70 dB . Modeling of our system's equivalent source levels based on their measurements, our echo sounder would generate a 90 kHz harmonic at 69 dB re. 1µPA @ 1m, which is below the hearing threshold of concern, within 1 m from the vehicle. We conclude from this that a soft start technique has no practical application for our survey operations. However, we nonetheless intend to take a conservative approach by increasing power upon startup at a 25% increase in power from zero to our operational power level of 93 dB over a five minute period.

Wildlife Monitoring

Marine wildlife monitoring will not be required by onboard personnel for these operations, but the operator will provide a narrative of any observations that occur within the survey area.. Because the survey echo sounder operated above 200 kHz, no safety zone is required. However, USGS will take the following precautionary measures:

- Not approach within 300 m of the haul-out site (consistent with NMFS guidelines);
- Expedite survey activity in this area in order to minimize the potential for disturbance of pinnipeds on land;
- Pinniped haul out site location is given in Table 4.
- The vehicle will continuously monitor the daily survey area to ascertain the presence, species and location of any marine wildlife is apparent in the intended survey area. The

vehicle master and onboard personnel will be watchful whales or marine mammals are observed in the area. The vehicle operator shall observe the following guidelines:

- Make every effort to maintain distance from sighted marine mammals and other marine wildlife;
- Do not cross directly in front of (perpendicular to) migrating whales or any other marine mammal or turtle;
- When paralleling marine mammals or turtles, the vehicle will operate at a constant speed that is not faster than that of the animals;
- Care will be taken to ensure female whales are not separated from their calves; and, if a whale engages in evasive or defensive action, the vehicle will reduce speed or stop until the animal calms or moves out of the area.

Table 4 Pinniped Haul Out Locations

LOCATION	SPECIES	LATITUDE	LONGITUDE
Sutro Baths, San Francisco, CA	California Sea Lion	37.78	-122.50
Seal Rocks, Point Lobos, San Francisco, CA	California Sea Lion	37.78	-122.52
Fort Funston, San Francisco, CA	California Sea Lion	37.73	-122.51

Vehicle Speed

The CPS operator will refrain from erratic operating behavior when transiting to eh survey site and shall operate at, or less than, a speed of approximately 4 knots once on survey station.

Limitations on equipment usage

Limitations on the frequency, pulse length, and pulse rate will be implemented to reduce potential harmful noises. The shortest possible pulse length and lowest pulse rate (pings per second) will be used, dependent on water depth.

4.5 Monitoring Reporting

A Post Survey Field Operations and Compliance Report will be submitted to CSLC staff as soon as possible but no more than 30 days after the completion of survey activities.

U.S. GEOLOGICAL SURVEY
PACIFIC COASTAL AND MARINE GEOLOGY SCIENCE CENTER

MANAGEMENT OF ACCIDENTAL DISCHARGE AND VESSEL INCIDENTS DURING OFFSHORE GEOPHYSICAL SURVEYS

1.0 INTRODUCTION

The survey operations will be conducted using two USGS personal watercraft (jet skis) that comprise our Coastal Profiling Systems (CPS). Because of the vehicle's small size, it is anticipated that response to any operational spills will be quickly identified and response will be initiated quickly and efficiently by the vehicle operator. Oil spills in United States (U.S.) marine waters shall be reported immediately.

2.0 OPERATIONAL SPILLS

Operational spills might involve one or more of the following substances carried on board the vehicles: (i) fuel and (ii) lube oil. The vehicles are equipped with woven polypropylene sheets (5 sheets) for rapid absorption of surface oil and protective gloves (1 pair), and a disposal bag (1) This oil spill materials are located in the forward cabinet of the vehicle. This spill kit is rated to clean up .25 gallons of liquid. All of the liquids (listed below) that could cause a hazardous spill are either in the fuel tank or in the vehicle engine. Spill occurrence will likely be during fueling, in the event of grounding or if any instance occurred that punctured the gas tank. In the event a spill occurred in the engine compartment, the oil spill kit would be used to contain the hazardous liquids and the bilge would not be emptied until it could be pumped out at a hazardous waste facility. We do not anticipate a spill of greater than .25 gallons.

(i) Fuel:

A spill kit shall be available for use in the event of a spill. If the fuel is spilled on the deck, it shall be immediately removed, bagged and disposed of at an appropriate hazardous waste reception facility. In the event of spillage in the water, the vessel master shall notify the Coast Guard and port facility.

(ii) Lube oil:

A spill kit shall be available for use in the event of a spill. If the oil is spilled in the machinery space, it shall be immediately removed, bagged and disposed of at an appropriate hazardous waste reception facility. In the event of spillage in the water, the vehicle operator shall notify the Coast Guard and port facility.

3.0 EMPLOYEE TRAINING ON OIL SPILL CONTINGENCY PLAN

Prior to the launching of the vessel for any activities, all captain and crew members on the vessel will have read the Oil Spill Contingency Plan, understand procedures to be implemented in the event of an oil spill, and know where the oil spill kit is located on the vessel.

4.0 VESSEL FUELING

All vessel fueling will be conducted at an approved docking facility. No cross vessel fueling will be performed. Appropriate spill avoidance measures during filling procedures will be observed. Refueling of the CPS is not allowed at the shoreline unless there is a compelling reason to do so and sufficient spill response equipment to address a spill is on site (i.e., sorbent and containment materials equal to approximately one-third the capacity of the fuel tank).

5.0 PRIORITY ACTIONS TO ENSURE PERSONNEL AND VESSEL SAFETY

Safety of vehicle operators and the vehicles are paramount. In the event that a crewman's injuries require outside emergency assistance, the PCMG safety officer shall be contacted immediately and emergency personnel contacted. While awaiting emergency assistance, the on board vessel master or qualified vessel crew personnel will render first aid and/or CPR. The nearest emergency medical facilities for this area is:

UCSF, Medical Center
505 Parnassus Ave.
San Francisco, CA 94143
(415) 353-1037

6.0 MITIGATING ACTIVITIES

If safety of both the vessel and the personnel has been addressed, the vessel master shall care for the following issues:

- Assessment of the situation and monitoring of all activities as documented evidence.
- Care for further protection of the personnel, use of protective gear, assessment of further risk to health and safety.
- Containment of the spilled material by absorption and safe disposal within leak proof containers of all used material onboard until proper delivery ashore, with due consideration to possible fire risk.
- Decontamination of personnel after finishing the cleanup process.

7.0 EMERGENCY CONTACTS FOR STATE AND FEDERAL AGENCIES

Emergency numbers for U.S.C.G. for the San Francisco and Central Coast Areas are:

Pacific SAR Coordinator - Alameda: 510-437-3700

Rescue Coordination Center, Alameda: 510-437-3700

Any oil spill in U.S. marine waters shall be reported immediately to the following state and agencies:

West Coast Oil Spill hot-line	800-OELS-911, *or*
Department of Fish and Game CalTIP	888-CFG-CALTip
(Californians Turn In Poachers & Polluters)	(888-334-2258). *and*
U.S. Coast Guard National Response Center	800-424-8802
California Office of Emergency Services (OES)	800-OILS-911 or 800-852-7550.

During the phone call, the following information will be given over the phone.

a. Name and telephone number of caller.
b. Spill location
c. What was spilled (oil, gas, diesel, etc.)
d. Estimated size of spill
e. The date & time spill was identified (same day).
f. Any oiled or threatened wildlife
g. Source of spill, if known
h. Activity observed at the spill site

After taking the necessary actions, the spill will be reported in writing to the Governor's Office of Emergency Services on their forms.

Additionally, California Department of Fish and Game certified wildlife rescue/response organizations will be contacted about the spill. In the Southern California area, these include the following contacts:

Oiled Wildlife Care Network	Animal Advocates
1-877-UCD-OWCN	323-651-1336
California Wildlife Center	South Bay Wildlife Rehab
310-458-9453	310-378-9921

U.S. GEOLOGICAL SURVEY
PACIFIC COASTAL AND MARINE GEOLOGY SCIENCE CENTER

GEOPHYSICAL SOUND SOURCE SYSTEMS MAINTENANCE RECORD

Odom Echotrac CV-100 Echo Sounder - 200 kHz Serial # 26067

1.0 Introduction

The USGS Pacific Coastal and Marine Science Center (PCMSC) owns and operates a broad range of geophysical sound sources, seafloor mapping systems, geologic and geotechnical sediment sampling systems, and oceanographic instrument systems. This requires considerable technical and operational support to successfully undertake and complete its field programs. Operational and technical support for these systems is provided by the PCMSC Marine Operations Facility (Marfac) in Santa Cruz, CA. Our Marfac group is staffed by a team of ten ocean engineers, electronics technicians, and marine engineering technicians. They operate, maintain and repair all geophysical and oceanographic systems used to support all of PCMSC's scientific field operations.

The Odom Echotrac ECTV-100 echo sounder is owned and operated by PCMSC. This system has been thoroughly checked, tested and calibrated according to the manufacturer's (Teledyne Odom) recommended procedures. This system is comprised of the Echotrac CV-100 Acquisition Controller/Power supply (Serial # 26067) and a 200 kHz transducer, Model # SMBB200-9. The results of this evaluation confirms the echo sounder system to be operating at Teledyne Odom's stated specifications in all regards.

System checkout includes physical inspection of all components, cables, connectors and electronics for any signs of corrosion, wear or damage, all necessary cleaning and full functionality checks.

These procedures were followed by a full at-sea check of all system parameters in order to confirm system performance meets specs. The Odom Echotrac CV-100 is fully compliant with Teledyne Odom stated capabilities and specifications.

Jenny White

Jenny White, Marine Superintendent

11/7/15

Date

USGS science for a changing world

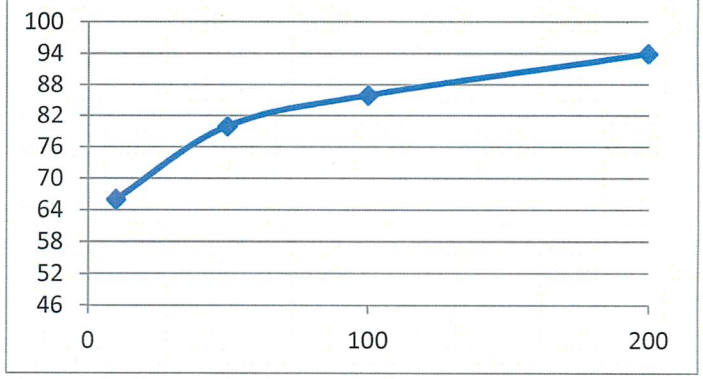
USGS Coastal and Marine Geology Program

Geophysical System Certification

ODOM ECHOTRAC CV-100

Date	11/2/2015
Serial #	26067

Receiver Sensitivity	High Freq	200	KHz



Power Supply (2417-0001-REVC)

Input Voltage (DC +24V)	√
+12V (TP8	√
+24V (J3 Pin 1, 3)	√
+5V (J3 Pin 2, 4)	√

Communication (2416-0019-REVA)

+5V (TP2)	√
+24V (TP1)	√

Transceiver Board (2416-0012-REVB)

+12V (TP1)	√
-12V (TP5)	√
-5V (TP4)	√
+5V (TP2)	√

High Frequency Transmit Power (50ohm)

Settings	Low (1)	Med (6)	High (12)
Ch1	15.31V	74.40V	289.10V

Communications

Com 1 (Depth I/O)		√
Com 2 (Remote)		√
Com 3 (GPS In)		√
Com 4 (Heave)		√
Ethernet		√

Reverse Polarity Alarm		√
Total Burn In Time	24 Hrs Minimum	√

Board Identification	SN	SW Ver
Ethernet / Comm I/O	110625	
Communications CPU	110193	4.06
Power Supply	111086	
High Freq Transceiver	110916	1.22
High Freq DSP	110617	4.02

Receiver Sensitivity Ch1	
Sensitivity	Depth in m
66	10
80	50
86	100
94	200
FREQ KHz	200

Jenny White

Jenny White **Marine Operations Superintendant**

11/7/15

Date

U.S. GEOLOGICAL SURVEY
PACIFIC COASTAL AND MARINE GEOLOGY SCIENCE CENTER

GEOPHYSICAL SOUND SOURCE SYSTEMS MAINTENANCE RECORD

Odom Echotrac CV-100 Echo Sounder - 200 kHz Serial # 26331

1.0 Introduction

The USGS Pacific Coastal and Marine Science Center (PCMSC) owns and operates a broad range of geophysical sound sources, seafloor mapping systems, geologic and geotechnical sediment sampling systems, and oceanographic instrument systems. This requires considerable technical and operational support to successfully undertake and complete its field programs. Operational and technical support for these systems is provided by the PCMG Marine Operations Facility (Marfac) in Santa Cruz, CA. Our Marfac group is staffed by a team of ten ocean engineers, electronics technicians, and marine engineering technicians. They operate, maintain and repair all geophysical and oceanographic systems used to support all of PCMGSC's scientific field operations.

The Odom Echotrac ECTV-100 echo sounder is owned and operated by PCMSC. This system has been thoroughly checked, tested and calibrated according to the manufacturer's (Teledyne Odom) recommended procedures. This system is comprised of the Echotrac CV-100 Acquisition Controller/Power supply (Serial # 26331) and a 200 kHz transducer, Model # SMBB200-9. The results of this evaluation confirm the echo sounder system to be operating at Teledyne Odom's stated specifications in all regards.

System checkout includes physical inspection of all components, cables, connectors and electronics for any signs of corrosion, wear or damage, all necessary cleaning and full functionality checks.

These procedures were followed by a full at-sea check of all system parameters in order to confirm system performance meets specs. The Odom Echotrac CV-100 is fully compliant with Teledyne Odom stated capabilities and specifications.

Jenny White

Jenny White, Marine Superintendent

11/7/15

Date

USGS
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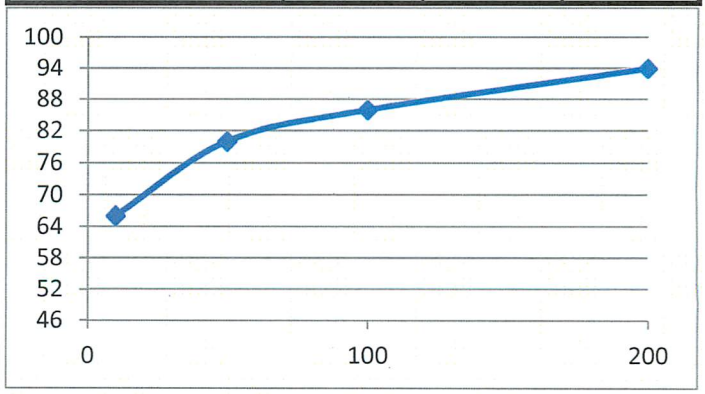
USGS Coastal and Marine Geology Program

Geophysical System Certification

ODOM ECHOTRAC ETCV-100

Date	11/2/2015
Serial #	26331

Receiver Sensitivity	High Freq	200	KHz



Power Supply (2417-0001-REVC)

Input Voltage (DC +24V)	√
+12V (TP8	√
+24V (J3 Pin 1, 3)	√
+5V (J3 Pin 2, 4)	√

Communication (2416-0019-REVA)

+5V (TP2)	√
+24V (TP1)	√

Transceiver Board (2416-0012-REVB)

+12V (TP1)	√
-12V (TP5)	√
-5V (TP4)	√
+5V (TP2)	√

High Frequency Transmit Power (50ohm)

Settings	Low (1)	Med (6)	High (12)
Ch1	16.09V	80.00V	306.20V

Communications

Com 1 (Depth I/O)		√
Com 2 (Remote)		√
Com 3 (GPS In)		√
Com 4 (Heave)		√
Ethernet		√

Reverse Polarity Alarm		√
Total Burn In Time	24 Hrs Minimum	√

Board Identification	SN	SW Ver
Ethernet / Comm I/O	110167	
Communications CPU	110180	4.06
Power Supply	110100	
High Freq Transceiver	110763	1.22
High Freq DSP	10983	4.02

Receiver Sensitivity Ch1	
Sensitivity	Depth in m
66	10
80	50
86	100
94	200
FREQ KHz	200

Jenny White

Jenny White **Marine Operations Superintendant**

11/7/15

Date